

On Nov 3 I will be presenting at a conference in the D.C. area, hosted by the U.S. Department of Homeland Security on the future of biology. The title and abstract are below. There will be only six slides with almost no words, consisting of PAO-type NASA pictures of Earth, Space, ISS, Orion capsule, biological specimens, space radiation environment, exercise on ISS etc. The theme is biological challenges to planetary exploration and settlement, speculation about long-term human evolution, and the role emerging biological technology may play in bridging the gaps.

Abstract:

**Micro to the Macro Biome
Can Biology Affect the Big Picture through Small Changes?**

**Lee Morin MD PhD
Johnson Space Center**

Life has had a profound impact on the geological history of our planet, which in turn has had a profound impact back on the evolution of life. Life has been able to adapt and spread into every planetary nook and cranny. At this point in history, life is becoming able to engineer itself, with extreme consequences we are only dimly able to foresee. One probable outcome will be the facilitation of the expansion of the range of life to beyond our planetary cradle, an evolutionary step as profound as the ancient transition from sea to land. Current efforts at NASA and aboard the International Space Station will be discussed in this context.

From the Micro to the Macro Biome

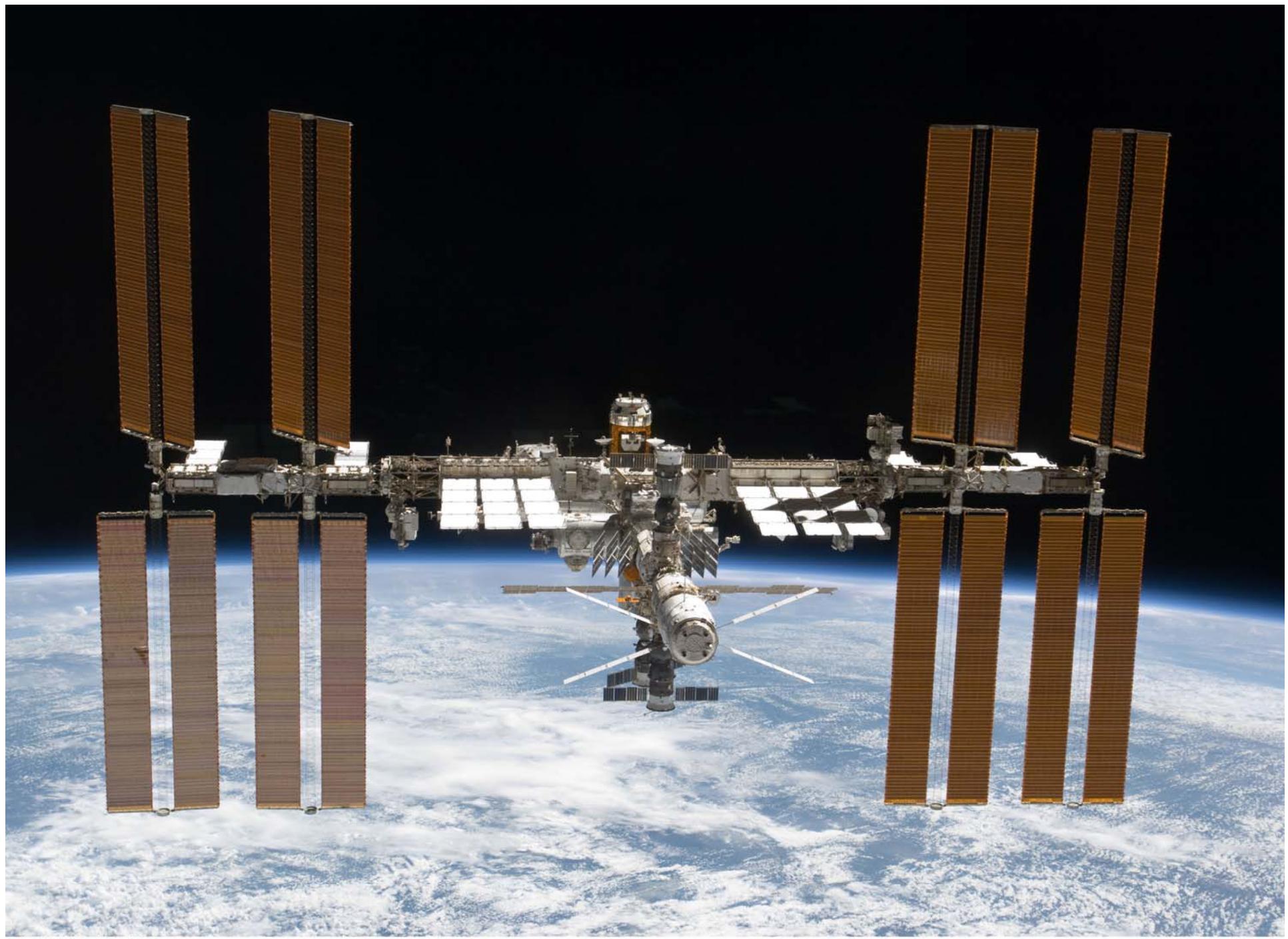
Can biology affect
the Big Picture
through small
changes?

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CAPT MC USN (Ret)

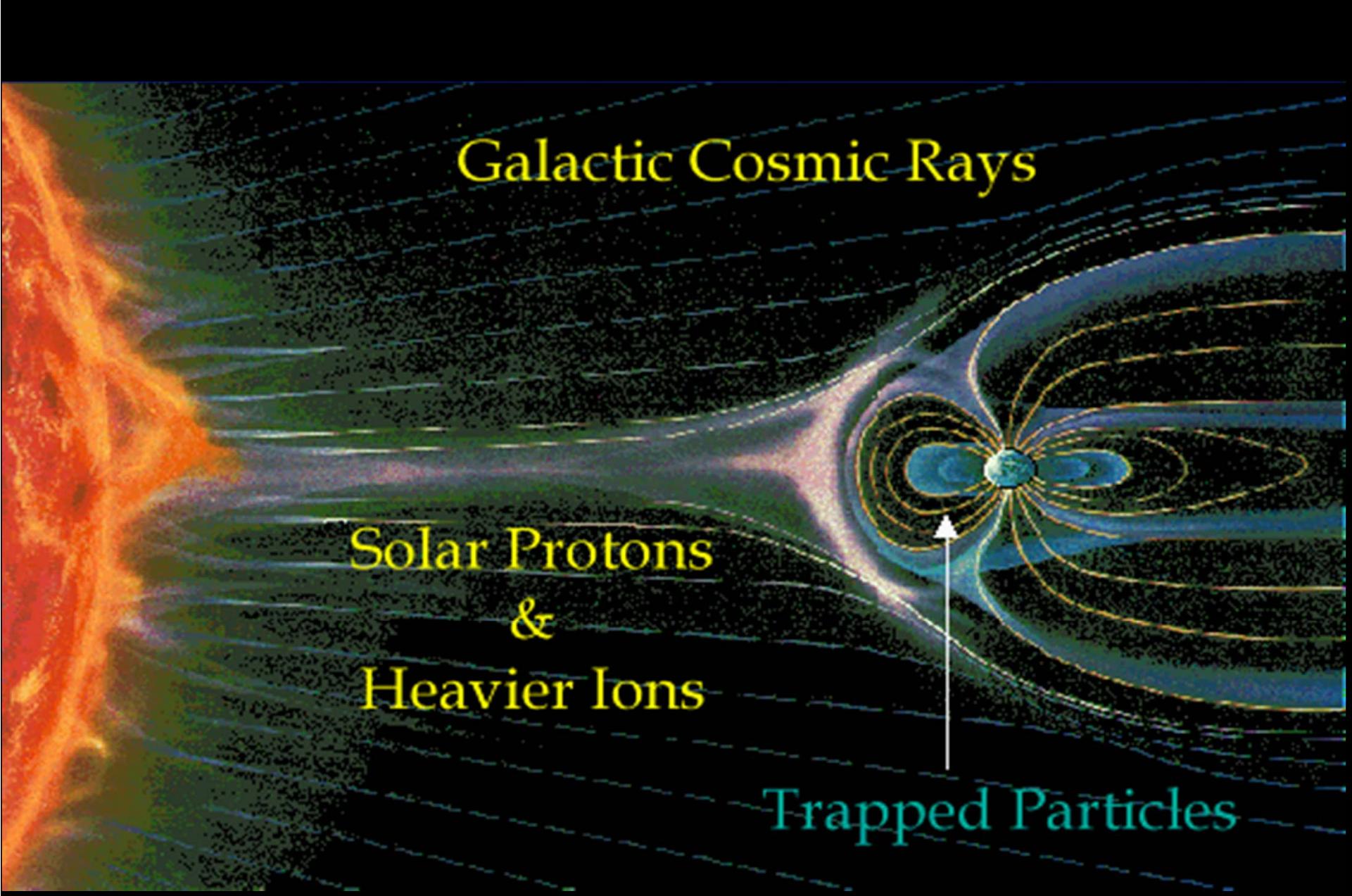








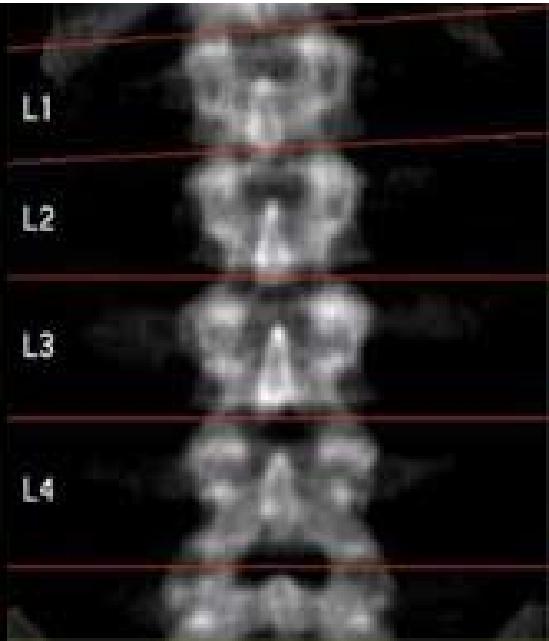
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Galactic Cosmic Rays

Solar Protons
&
Heavier Ions

Trapped Particles



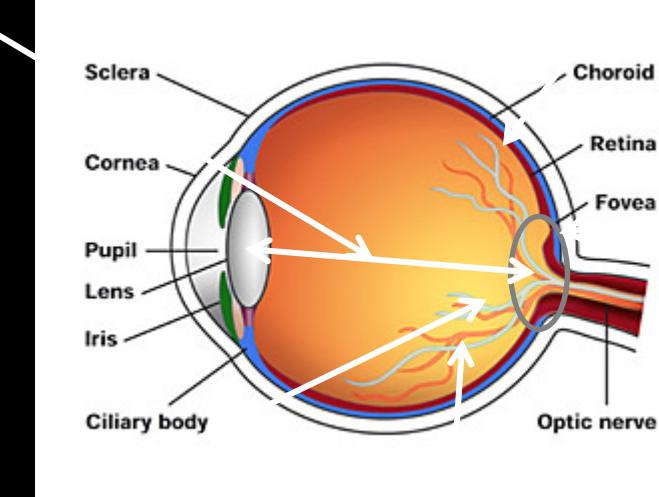
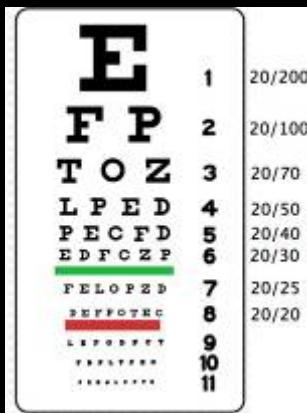
Visual Impairment Intracranial Pressure Project Syndrome Signs

Background:

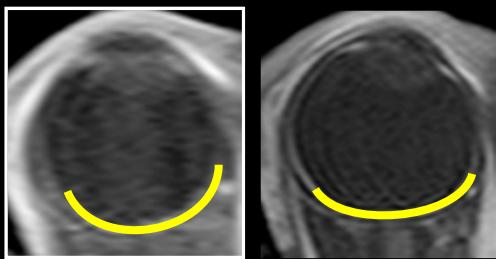
- 15 known “clinical cases” (of 36 U.S. long duration ISS crew) members
 - Each with different degrees of symptoms
 - Some with elevated measures of Intracranial Pressure (ICP) post flight
 - Incidence numbers vary with criteria and time period

• Hyperopic Shifts

-Up to +1.75 diopters



• Globe Flattening



Normal Globe

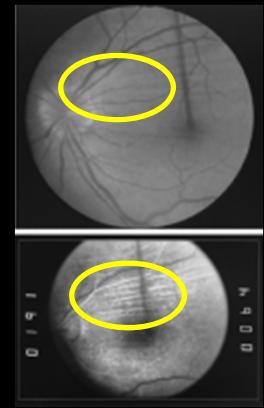
Flattened Globe

MRI Orbital Image showing globe flattening

- Altered Blood flow
 - “cotton wool” spots

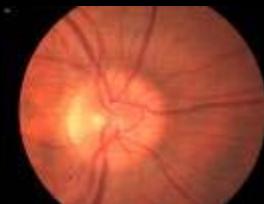


- Choroidal Folds - parallel grooves in the posterior pole



- Optic Disc Edema (swelling)

ICP



- Increased Optic Nerve Sheath Diameter



ISS Medical Support

